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## **WHAT IS DIFFICULT IN NAVAL SENSEMAKING?**

Cognitive and Social Issues (Track 4)

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# WHAT IS DIFFICULT IN NAVAL SENSEMAKING?

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## *Abstract*

This article is concerned with what decision makers perceive as difficult in military sensemaking. To answer this question interviews with 9 Swedish navy officers were conducted using issues from military planning manuals together with mission activities as basis for the questions. The results show that the respondents perceive difficulties in mainly three areas: the enemy (enemy forces, enemy courses of action); own courses of action; and, initiation of replanning. Looking at the reason for the perceived difficulties, uncertainty emerged as a major cause and the difficulties were linked to uncertainty in two ways: they were either caused by uncertainty or they could cause uncertainty. Sensemaking require two things of people: they have to come up with an idea of what to do, and they have to make sure that the idea accomplishes the mission. This study shows that what is difficult in sensemaking is not coming up with something to do; what is difficult is ensuring that the idea accomplishes the mission. Therefore support for sensemaking should focus on helping people in what they find difficult in deciding what will accomplish the mission.

## INTRODUCTION

This paper is concerned with what military decision makers perceive as difficult when they prepare for, and carry out military missions. The reason for studying this is to give guidance concerning which parts of these activities that can gain from engineered support. The focus of the paper is on what decision makers find difficult, and the rationale for this is the simple assumption: it is more likely that people will appreciate support that helps them with things they find difficult, trying to support them in tasks they already find easy will most probably leave the tool unused. If we want to support people in these activities, the design task is first to identify the human functions that need to be supported, and then try to find the procedures, organisations and technology that will help people create the requisite products (Brehmer 2007, 211-232). Consequently, this article will first identify what people do when they prepare for, and carry out military missions and after that investigate what they find difficult in those activities.

## Sensemaking

Sensemaking is what people do in order to decide how to act in the situations they encounter (Weick 1995). Since deciding what to do is the main task for the military command function, sensemaking is a major factor of command and control, C2 (Jensen 2007). This paper views sensemaking as it is proposed by (Brehmer 2006a, 2007) and further developed by (Jensen 2006, 2007). This view of sensemaking builds upon the framework by (Weick 1995) whose primary focus is organizational sensemaking: "The basic idea of sensemaking is that reality is an ongoing accomplishment that emerges from efforts to create order and make retrospective sense of what occurs" (Weick 1993, 628-652). Efforts of sensemaking occur when the current state of the world is perceived to be different from the expected state or when there is no obvious way to engage

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the world (Weick, Sutcliffe, and Obstfeld 2005, 409-421). To make sense of the disruption, people look first for reasons that will enable them to resume the interrupted activity and stay in action. Weick's sensemaking framework has its roots in James' pragmatism and explicitly refers to the selectivity and the goal directedness of human consciousness (James 1907).

The key notion in the sensemaking model developed by Brehmer and Jensen is that sensemaking is oriented towards action: command and control is not about deciding how things are<sup>3</sup>, it is about finding a course of action (COA) that accomplishes the mission. Consequently, sensemaking can not be considered finished until an idea of what to do exists. Looking at James' pragmatism, the 'cash value' of an idea is determined by its consequences. Therefore, to estimate the 'cash value' of an idea, it must be tested through action. Furthermore, an idea is not fully expressed unless there is a description of how it should be tested. Looking at sensemaking, an idea is tested in two steps. Initially it is determined whether the idea is consistent with the data that are, or can become, available before subjecting it to action. However, truth is something that happens to an idea as James puts it<sup>4</sup>, and the second test, when subjecting it to action, makes the idea true or false. One could say that before the idea is subjected to action, it is plausible; after it has been implemented, one can determine whether it is true or false (Brehmer 2006b).

This line of reasoning makes sensemaking a form of explicit or implicit hypothesis generation and hypothesis testing (Brehmer 2006a). An initial idea of how to solve the mission is generated. The idea is tested using the data available and the result of the tests lead to revision and/or refinement of the initial idea. This process of revision and refinement continues until the commander is satisfied with the solution according to some criteria. If sensemaking is regarded as a process of hypothesis generation and testing, then some explanation is suggested for why studies show that planners tend to iterate back and forth between understanding the mission, understand the situation, devising of tentative COAs and evaluation of the tentative COAs when they decide what to do (Schmitt and Klein 1999). A similar view, although not based on James' ideas, is given in the Critique-Explore-Compare-Adapt loop; a model of decision making that is based on the constructivist view on cognition (Bryant 2003).

The sensemaking model referred to here also rejects the bottom-up model 'data → information → knowledge → understanding' that is so common in discussions of C2 (e.g., Endsley 1995, 32-64). Sensemaking uses data, but it is not based on data. Sensemaking is a top-down process that starts with the mission<sup>5</sup>. The mission then guides the further sensemaking process, and the provisional understanding is tested against data available. However, the data alone do not produce the understanding. The reason for this is the problem of induction; no amount of data will ever be sufficient to produce truth. The only way around this problem is to base understanding on some preliminary hypothesis that is refined in the sensemaking process by testing it against data (Brehmer 2006a). Further implications follows from this proposition: when you use data to test a hypothesis the amount of data is of no importance, what is crucial to enable proper testing is that the relevant data is selected.

### **A functional model of sensemaking**

The sensemaking model by Jensen (2007) puts forward four functions that are required to achieve successful sensemaking (see Figure 1) : (1) understand the mission; (2) understand the preconditions; (3) find a way to accomplish the mission; and, (4) evaluate the situation. Taking a

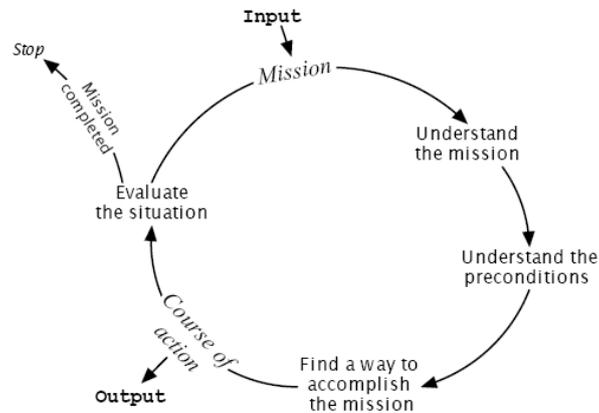
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<sup>3</sup> Deciding how things are may however be a prerequisite to deciding what to do. Indications of this are found in the functions "Understand the situation" and "Evaluate the situation".

<sup>4</sup> Weick's "making retrospective sense of what occurs" echoes from this proposition (Jensen 2007).

<sup>5</sup> Formally, what is received is a task; the task is then transformed into a mission. However, in this text there will be no distinction between task and mission.

functional perspective means that the model only specifies what must be accomplished in each function. How each function is implemented (which procedures, what organisation, and which technology is used) can be different in each C2-system. Furthermore, since the environment in which the C2 system is situated is constantly changing, the C2 system must adapt. Thus, even the instances of any given C2 system will most certainly be different from time to time.



**Figure 1. The functions of sensemaking. (Used with permission from Jensen, 2007)**

The model also stresses that military sensemaking is an ongoing process. It begins when a mission is received. The first task then is to understand the mission: What must be accomplished? The second step is to understand the preconditions: What resources are available? What does the terrain look like? What are the time constraints? When all these matters have been sorted out, it is time to figure out how the mission should be accomplished. Should we attack over the river, or is it better to stay and hold? When a sufficiently good COA has been found it is implemented. Now it is time to evaluate the situation: What problems must be attended to? Are there any opportunities that can be exploited? The functions are initiated in the described sequence. However, during sensemaking people tend to skip back and forth between the different activities that accomplish the functions.

### **Descriptions of sensemaking**

Military commanders and military command teams have been performing sensemaking long before the conception of sensemaking appeared. Sensemaking is about finding a way to accomplish the mission, and that is what C2 is all about. What steps a commander or a command team should take to figure out what do is prescribed in military planning manuals. These manuals contain the issues that should be attended, together with a method for solving the military problem the decision makers are facing. The issues found in these manuals, together with mission activities, was therefore chosen to serve as point of departure when the question ‘What is difficult in sensemaking’ was investigated.

## **METHOD**

### **Subjects**

The study was conducted as an interview study. The respondents were chosen using a combination of purposive and convenience sampling (Mc Burney 1994). The interviews were performed with 9 Swedish navy officers with ranks from Lieutenant Commander to Vice Admiral, age ranging from 34 to 70, the criteria for selection being that they must have been in command of a unit comprising of more than one navy vessel (preferably on more than one

occasion). Eight officers were specialized in anti surface warfare (ASuW) and/or anti submarine warfare (ASW) and one officer in mine clearance warfare (MCW). They had led between 10 to 100+ military planning processes on the tactical level or above, and they had led between 10 and 100 naval missions (exercise and/or live). All respondents were men. At the occasion of the study none of the respondents were in service in the area that the interview actually covered.

<b>Planning</b>	<b>Execution</b>
1. What must be accomplished	16. Monitor the situation
2. Freedom of action	a. Civilian forces
3. Uncertainties	b. Own forces
4. Immediate actions	c. Enemy forces
5. Success factors	d. Third party
6. Civilian forces	e. Weather, terrain, visibility
7. Own forces	17. Decide whether it proceeds according to plan
8. Enemy forces	18. Decide whether changes are needed within current plan
9. Third party	19. Decide whether it deviates to such extent that a new plan is needed
10. Terrain, weather, visibility	20. Decide whether a situation has evolved that can be exploited such as the mission can be accomplished in a more expedient way
11. Comparison of forces	21. Enemy courses of action
12. Enemy courses of action (ECA)	22. Own courses of action
a. Hard to generate sufficient amount?	23. Wargaming
b. Hard to generate sufficiently different?	a. Structured
c. Hard to judge the realism of the ECA?	b. Mental simulation
13. Develop own course of action (OCA)	
a. Hard to generate sufficient amount?	
b. Hard to generate sufficiently different?	
c. Hard to judge the realism of the ECA?	
14. Selection of OCA	
a. Hard to compare?	
b. Hard to judge strengths and weaknesses in each?	
15. Wargaming	
a. Structured	
b. Mental simulation	

**Figure 2. Interview guide**

## Procedure

The duration of the interviews varied from 30 minutes to 1½ hour and was conducted using an interview guide as aid. The interview guide contained the topics that should be attended to when planning according to Swedish manuals (see Figure 2). During the first interview the topics were structured according to the four functions in the sensemaking model<sup>6</sup> (Figure 1), the purpose of this was to put the questions in a context that was relevant to the model of sensemaking. However, this approach did not turn out so well. The sensemaking model as described in this paper is quite new and the respondents were not familiar with the concepts in the model. In response to this the topics were restructured in to two larger groups: planning and execution (two categories that the author deemed more familiar to the respondents). This structure appeared more natural to the respondents and the following interviews were conducted using the latter interview guide.

The interviews were conducted between 2006-10-17 and 2006-11-14 either at a place chosen by the respondent or at the office of the interviewer. All interviews were recorded on a voice recorder (standard mp3-player). On the occasion of the interview the respondents were first introduced to the purpose of the interview and were given the opportunity to ask some general questions.

<sup>6</sup> Topics 1,2 was sorted under “Understand the mission”, topics 2-11 under “Understand the preconditions”, topics 12-15 under “Find a way to accomplish the mission” and topics 16-23 under “Evaluate the situation”

After the introduction the interview began and the respondents were asked questions according to the topics in the interview guide. The questions were formulated as follows:

*How do you figure out what must be accomplished and what do you find difficult with that?  
How do you generate own courses of action, and what do you find difficult with that?*

The respondents answered and whenever the interviewer needed clarification supplementary questions were asked. However, when giving an answer the respondents tended to skip back and forth between different issues in the interview guide so the interview was continued until the interviewer deemed that all topics had been sufficiently covered.

## **ANALYSIS**

The voice recordings were transcribed verbatim, leaving out pauses, humming, et cetera. After that the interviews were coded by the author while listening to the recordings. Whenever the respondent expressed a perceived difficulty (actually saying the word 'difficulty' or any synonym) the time, the topic and a brief transcription of the statement were recorded. All these instances were later located in the transcriptions and a portion of the transcription was transferred to the coding. In this process a total of 119 perceived difficulties were recorded. Three of these codes contained more than one difficulty ("it is difficult if there is [...] or there is [...] or there is [...]") and when they had been elaborated, a total of 123 difficulties were to be analysed.

As said earlier, the respondents tended to shift back and forth between topics during the interviews. Since some topics were listed both under 'planning' and 'execution' it was sometimes hard to distinguish under which topic an answer belonged: Did the respondent mean during execution or did he mean during planning? To solve this, all occurrences of 'enemy courses of action' and 'own course of action' had to be sorted together.

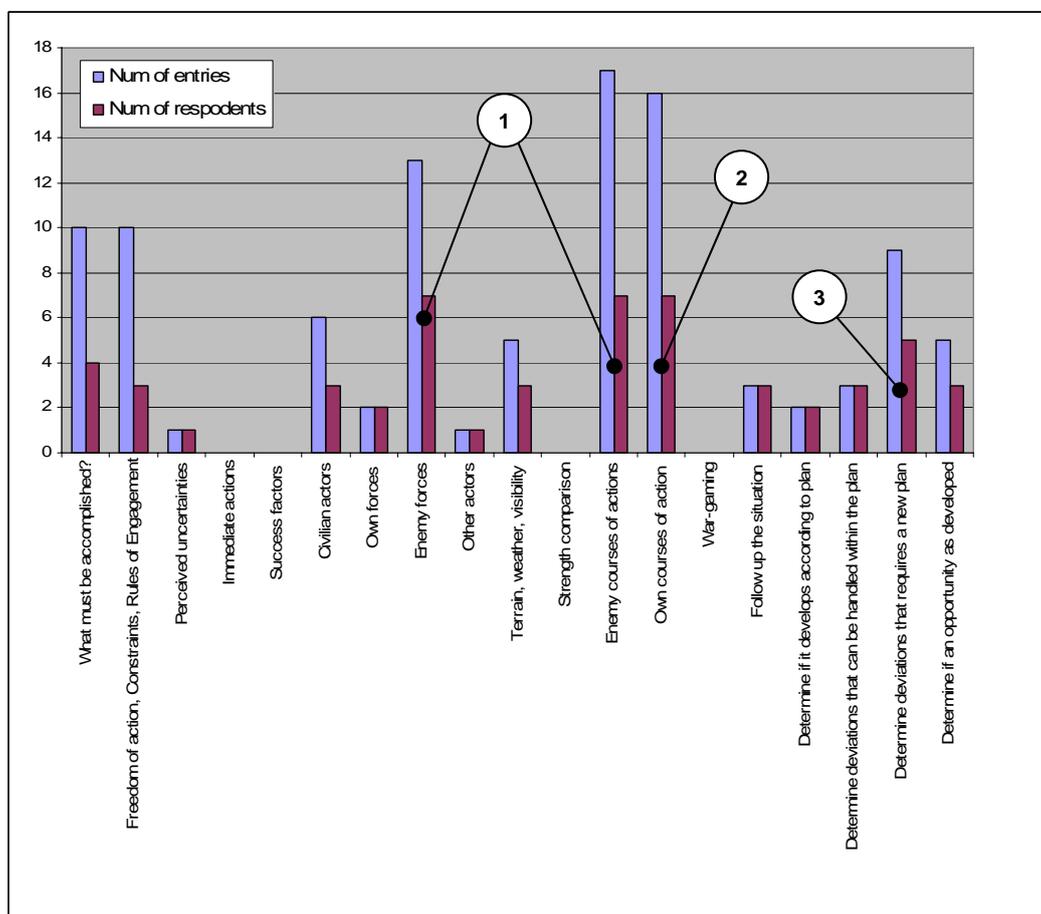
To identify what topics in the interview guide that the respondents perceived as difficult, each code was sorted under the corresponding topic from the interview guide and was presented in a diagram (see Figure 3). In this process 102 of the codes could be sorted under a topic from the interview guide. The remaining 21 were discarded from further analysis during this step - they either were too general or dealt with another subject, e.g., 'It is difficult because we don't have those IT-systems' or 'Another thing that is difficult is group-think'. However, sorting codes in this way can be somewhat misleading: if only one respondent expressed several difficulties related to a particular topic, that topic would maybe be given unmerited weight in the analysis. To solve this problem each code was also sorted under its corresponding topic under the constraint that only one code from each respondent may occur under each topic. In short, both the number of examples of each difficulty, regardless of the number of respondents mentioning it, and the number of respondents mentioning a difficulty were analyzed

Up to this point the analysis had been focused on the difficulties themselves. Nevertheless, if one could identify what caused the difficulties, this would give further guidance to what support could be appropriate (e.g., treat the disease, not the symptoms). To identify what caused the difficulties the original 119 codes was re-examined. For every code the cause of the perceived difficulty was noted, e.g., 'If there is time pressure, it is difficult to perform the necessary dialogs' was categorised 'Time pressure'. The next step was to apply a process of data reduction and sort the causes into larger categories. During this process 10 categories were identified. After that the codes were sorted under the respective categories. 7 codes were discarded due to problems of assigning them to a category (i.e., figuring out what caused the difficulty).

To assess the validity of the categorisation, 32 of 112 codes that could be assigned to a category were randomly selected. For each of these codes the transcription for that code together with all the identified categories was given to a second rater. The second rater was given instructions on how to interpret the different categories both through explanation as well as through example; 1-3 for each category. The examples did not belong to the set of the 32 randomly selected. After that the task of the second rater was to assign each of the 32 codes to one of the categories presented. When analysing the result, two assignments were discarded due to ambiguities (the second rater assigned the code to more than one category) which left 30 codes.

## RESULTS

A total of 102 codes of perceived difficulties could be sorted under the topics in the interview guide. Figure 3 shows how the codes were distributed among the topics together with distribution of codes under the constraint that only one code from each respondent may occur under each topic.



**Figure 3. Codes sorted under issues from interview guide**

During the categorization 10 categories were found under which the codes were sorted (the number states how many codes were sorted in each category): freedom of action (3); mental limitations<sup>7</sup> (14); mental adjustments<sup>8</sup> (7); military-civil cooperation (7); uncertainty (69);

<sup>7</sup> Refers to the desire of being creative: “if you can find something tactically cunning...so you can break trough”, “...have enough width [in your COA]...”, “...not get caught in a stereotypical pattern”

difficulties to choose COA (4); complexity (2); information management (2); technology (2); time-pressure (2). The inter-rater validation resulted in agreement on 24 of 30 (80%) codes (assigning one code to one of the ten categories).

Looking at Figure 3 according to the number of respondents that have mentioned difficulties in a topic, three areas with perceived difficulties can be distinguished:

1. 'Enemy'; an aggregation of 'Enemy forces' and 'Enemy course of action'. Out of 30 perceived difficulties in this area 25 were categorised 'Uncertainty'.
2. 'Own courses of action'; out of 16 perceived difficulties in this area, 8 were categorised 'Mental limitations', 4 was categorised 'difficulties to choose COA'.
3. 'A new plan is needed'; out of 9 perceived difficulties in this area, 5 were categorised as 'Uncertainty' and 4 as 'Mental adjustment'

Uncertainty emerged as the major cause to difficulties (except in 'Own courses of action'). The codes in this study is related to uncertainty in two ways: Either the perceived difficulty *was caused by uncertainty*: 'What does the enemy want, what is his capacity, what is his view of the world, that is what I want to get at...and what are his weaknesses and strengths...' or it was perceived difficulty because it *could cause uncertainty*: '...the hardest thing is to ensure that every one knows what's intended [e.g. understands the mission, understands the rules of engagement etc. ]'

## DISCUSSION

Sensemaking is about finding a course of action that accomplishes the mission, given the mission and the situation at hand. Therefore, two things are required of the people engaged in sensemaking: they have to come up with an idea of what to do, and they have to make sure that the idea accomplishes the mission, i.e. they have to do the right things. Consequently, what could prevent successful sensemaking is either of the following: People do not come up with anything to do, or people do the wrong things.

So, do people seem to have difficulties coming up with ideas of what to do? Lipshitz and Strauss have studied how military decision makers conceptualize and cope with uncertainty (Lipshitz and Strauss 1997, 149-163). The results of their study point out that the decision maker employ different coping strategies to prevent uncertainty to block action. Lipshitz and Strauss use the following definition of uncertainty: "Uncertainty in the context of action is a sense of doubt that blocks or delays action." (Lipshitz and Strauss, 1997:150). Inspired by their definition, we will further discuss if the respondents in this study experience uncertainty as something that blocks or delays action.

When listening to the respondents it comes to mind that no one actually experiences their work as particularly difficult, but instead as more of a challenge. Difficulties are looked upon as a natural ingredient in military activity and part of the profession is handling those. Consequently, the uncertainties they experience may cause some difficulties, but they do not block action. The respondents speak about hesitation and indecisiveness, but if a decision has to be made they make the best decision they can, given the situation at hand<sup>9</sup>. So, in this study uncertainty does not seem to block action.

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<sup>8</sup> Refers to the problem of abandoning your old plan: 'it's something human about it...it's very hard to say: ahhh...lets skip it...lets start all over again', 'the difficult thing was not to realize that I had to make a decision, the most difficult part was to make the decision'

<sup>9</sup> Omission to act often has more severe consequences than choosing the wrong method is something an officer is taught from the very beginning in his/hers career.

This brings us to the delaying of action. Lipshitz and Strauss have together with others identified this behaviour as a strategy to cope with uncertainty (Janis and Mann 1977; MacCrimmon and Wehrung 1986; Shapira 1995). McCrimmon and Wehrung state that decision makers (managers in their case) take an active stance towards uncertainties: When faced with risk, the decision makers try to 'adjust the risks' to gain time, information or control. Time allows for information to be gathered and by delaying a decision a hazy situation is given a chance to clear up. Janis and Mann (1977) also describe this strategy (they call it procrastination). However, they describe it as a way of defensively avoid making a decision: If I don't have to alter my current course of action right now I can wait. This is accompanied with bolstering of the least objectionable alternative.

The respondents in this study lean towards the stance taken by Lipshitz and Strauss (1997), and McCrimmon and Wehrung (1986). If no negative consequences follow from delaying a decision, why not wait and see if the situation clears up. However, identifying the latest point in time when the decision must be made is often coupled with such postponing. One can suspect that later, when they reach that point they act as if a decision has to be made and accordingly make the best decision they can, given the situation at hand. On the other hand, certain decisions seem especially hard to make. The respondents emphasize the problem of realizing that the current plan has been invalidated and that replanning must be initiated<sup>10</sup>. Two major difficulties were mentioned: the problem of selecting and integrating indicators (what indicators should be selected and when do their levels indicate turn over) and the respondents own mental resistance towards abandoning their old plans. On these occasions the risk of postponing the decision for too long is increased. This behaviour is more in line with Janis and Mann's (1977) defensive avoidance.

The second problem that can prevent successful sensemaking is that people do not come up with the right things to do. In contrast to not coming up with anything to do, this issue is of much more concern to the respondents. This is not especially surprising; in order to win you must outperform your opponent and doing the right things of course increases your chances. So, how do we make sure that people do the right things?

In this paper sensemaking is viewed as a process of hypothesis generation and testing. It was stated that testing of an idea is conducted in two steps: First, it is tested for consistency with available data before it is subjected to action; this makes the idea plausible. Second, the idea is subjected to action to determine whether it is true or false (e.g., if it is a good course of action or a bad one). This line of reasoning, together with the two areas identified as especially difficult ('enemy' and 'own course of action'), suggests that support engineered to help the staff to check whether an idea is plausible or not could be useful. Such support should give the decision maker an opportunity to test own courses of actions and evaluate how well they perform in different hostile environments before they are subjected to action.

Looking at the topics 'What must be accomplished' and 'Freedom of action, Constraints and Rules of Engagement' it becomes apparent that a low number of respondents have mentioned many difficulties. In 'What must be accomplished' the difficulties have to do with making sure that the mission statement (the order) is properly understood. To reduce these difficulties some respondents stress the importance of meeting in person before embarking on a mission. However, it is not always possible to meet in person and on such occasions people must rely on images and text. Some research shows that people have problems communicating and/or

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<sup>10</sup> 'it's something human about it...it's very hard to say: ahhh...lets skip it...lets start all over again', "the risk is that you are so constrained by your own planning that you make wishful thinking...it's probably going in the direction I want' (from the interviews)

understanding a statement of 'commander's intent' (Klein 1994, 75-85). Consequently, finding ways to express the mission statement in such way that receiver understands it properly would probably improve sensemaking. In 'Freedom of action, Constraints and Rules of Engagement' the difficulties relate mainly to expressing and interpreting 'Rules of engagement'. Partial explanation for this may be given by the fact that the international way of handling rules of engagement is quite new to Swedish navy officers. Training and further experience in international missions will probably solve this problem.

This study was conducted as an interview study and none of the respondents were in active duty in the area which the interview concerned. This became apparent during the interviews: the respondents described the experiences that the interview covered in the light of their current occupation. It was hard to identify whether an answer built upon experiences from their current occupation or from their time in active duty. Yet another problem with the study is that some answers given by some respondents' sounds very much like 'textbook answers'. It is hard to judge if they actually have experienced what they talk about or if they just have read it in a manual.

The results in this paper indicate that what is difficult in sensemaking is not coming up with anything to do; the difficult part is ensuring that the idea is a good way of doing things. The results also point out three areas that are of particular interest: 'the enemy', 'own courses of action' and 'a new plan is needed'. Therefore support for sensemaking should focus on helping people test if the ideas they come up with can accomplish the mission, rather than helping people to come up with ideas. How this support eventually should be engineered is however yet to be established

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